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The Neogene and Pleistocene Insectivores (*Mammalia*) of Poland. III. *Soricidae*: *Beremendia* and *Blarinoides*

[Pp. 359—386, 38 text-figures]

Owadożerne (*Mammalia*) neogenu i plejstocenu Polski. III. *Soricidae*: *Beremendia* i *Blarinoides*

Насекомоядные (*Mammalia*) неогена и плейстоцена Польши. III. *Soricidae*: *Beremendia* и *Blarinoides*

Abstract: This paper contains a description of a new species, *Beremendia minor* n. sp. (*Soricinae, Neomyini*) from Rębielice Królewskie I, the locality referred to the Lower Villafranchian, and two other species, *Beremendia fissidens* (Petényi, 1864) and *Blarinoides mariae* Sulimski, 1959 (*Soricinae*: *Neomyini, Blarinini*) from 9 fossil localities (Podlesice, Rębielice Królewskie I, Rębielice Królewskie II, Zamkowa Dolna, Kadzielnia, Kielniki, Kamyk, Zalesiaki and Kozi Grzbiet), which embrace the period from the close of the Miocene to the Cromerian Interglacial. A discussion of the systematic position of the above-mentioned forms, their measurements and illustrations are also given. The specimens of *Beremendia fissidens* and *Blarinoides mariae* from different localities have been compared with each other within the species and one species has been compared with the other.

INTRODUCTION

The present paper is the third part of the designed scientific description of the insectivore remains from the Neogene and Pleistocene of Poland. The previous papers dealt with the *Erinaceidae* and *Desmaninae* (Rzebik-Kowalska, 1971) and the genera *Paranourosorex* and *Amblycoptus* of the family *Soricidae* (Rzebik-Kowalska, 1975). On account of the fact that one of the localities from which the materials under study were obtained, i.e. Podlesice, was previously considered to represent the Pliocene and has recently been referred to the close of the Miocene (Berggren and von Couvering, 1974), the title of this series of papers „The Pliocene and Pleistocene Insectivores (*Mammalia*) of

Poland" has been changed into „The Neogene and Pleistocene Insectivores (*Mammalia*) of Poland".

In the present paper I am concerned with two genera of the *Soricidae*, namely, *Beremendia* KORMOS, 1934 and *Blarinoides* SULIMSKI, 1959. They belong to two different tribes of the subfamily *Soricinae*, the *Neomyini* and *Blarinini*, but have been included in one study, because their remains were sometimes confused with each other in some papers owing to their similarity in size.

Short characterizations of the localities from which the material under study was obtained are given in two preceding papers (RZEBIK-KOWALSKA, 1971, 1975). The present paper includes also material from other fossil localities in Central Poland. These are as follows:

Kielniki. A rich molluscan fauna (STWORZEWICZ, 1975) and remains of small vertebrates have been found here in the fillings of karst crevices. In geological age this fauna approximates to that of Kamyk; thus, it probably comes from the Günz Glaciation (KOWALSKI, 1975).

Zalesiaki. The stratigraphy of this locality could not be established because of its having been demolished by the continued working of the quarry. Moreover, the study of its fauna has not, as yet, been completed. This fauna consists chiefly of Cromerian elements, some samples, however, contain Pliocene remains, no doubt derived from older deposits.

Kozi Grzbiet. This locality has provided remains of a rich fauna of large and small vertebrates from the Cromerian period. So far this fauna has been described only preliminarily by KOWALSKI (1975).

Measurements were taken according to the scheme presented in Fig. 1 in my prewious paper (RZEBIK-KOWALSKA, 1975), partly based on the work by H. de RÜMKE and C. G. BRUIJN (1974).

The material described in this paper is preserved in the collection of the Institute of Systematic and Experimental Zoology in Cracow.

I am grateful to Mr. Krzysztof MALCZEWSKI for drawing the figures.

SYSTEMATIC PART

Family *Soricidae* GRAY, 1821
Subfamily *Soricinae* FISCHER von WALDHEIM, 1817
Tribe *Neomyini* REPENNING, 1967
Genus *Beremendia* KORMOS, 1934

Beremendia fissidens (PETÉNYI, 1864)

(Figs. 1—11, 21,23, 33—35)

1958 — *Beremendia fissidens* (PETÉNYI, 1864), K. KOWALSKI, An early Pleistocene fauna..., pp. 13—14, Fig. 4.

1959 — *Beremendia fissidens* (PETÉNYI, 1864), A. SULIMSKI, Pliocene insectivores... pp. 152—154, Pl. III, Fig. 7, Text-fig. 4: 1a—f.

1960 — *Beremendia fissidens* (PETÉNYI, 1864), K. KOWALSKI, Pliocene insectivores and rodents..., p. 171.
1960 — *Beremendia fissidens* (PETÉNYI, 1864), K. KOWALSKI, An early Pleistocene fauna..., p. 6.
1962 — *Beremendia fissidens* (PETÉNYI, 1864), A. SULIMSKI, Supplementary studies..., pp. 474—476.
1962 — *Beremendia fissidens* (PETÉNYI, 1864), A. SULIMSKI, O nowym znalezisku..., p. 221.
1964 — *Beremendia fissidens* KORMOS, 1934, K. KOWALSKI, Palaeoecology of mammals..., p. 77.

The list of synonyms contains only the names used for materials from Poland

Material. A list of materials is given in Table I. The highest number of single elements, e.g. right M_1, has been assumed to be the minimum number of animals. I_1 appears to be the commonest element preserved, being followed by M_1, I^1 and P^4.

Description. Only one incomplete rostral part of skull has been preserved in the material possessed. In profile it shows a depression above the alveolar margin. This depression begins just behind I^1 to end between A^3 and A^4 and is shallower in the middle part, owing to which it makes the impression of being transversely divided into halves. The infraorbital foramen begins over P^4 and extends to the first root of M^1. The oval or subcircular lacrimal foramen is situated above M^1, in the middle of or somewhat below the infraorbital foramen diameter parallel to the long axis of the skull. The anterior palatine foramina are fairly large and oval, and they lie close to each other between A^1—A^1, while the smaller posterior ones are placed between M^1—M^1. The zygomatic process is short and, while seen from below, lies in the extension of the metastyle of M^2. The maxillary bones are somewhat swollen in the vicinity of the large incisors I^1. The teeth are pigmented. The pigment, if visible, is red, dark red or almost black, especially at the tops of teeth.

The dental formula is $\frac{1 - 5 - 3}{1 - 2 - 3} = 30$

Upper dentition. I^1 is robust, bifid, with a large talon. The shape of the talon is variable. In a side view, it varies from relatively narrow and tongue-shaped to broad and spade-shaped. The lateral root-crown junction line is also various in different specimens. In occasional specimens it runs perpendicularly to the horizontal axis of the tooth, but generally it is more or less oblique to this axis. In both cases it may be straight, or bends, separating the talon. The cingulum of I^1 is best seen on the external side of the talon. The first four antemolars decrease in size successively; the second is only slightly smaller than the first, the third is half the size of either of the first two, and the fourth is tiny, half the size of the third. All of them are unicuspid and lack the posterolingual cusps. A^1—A^3, ending sharply at the front each, are concave on the lingual and convex on the labial side, and hang slightly over towards the back of the maxilla. Their cingulum is distinct on both the external and the internal side. On the other

Table I

Beremendia fissidens (PETÉNYI) — material

Locality	Number of fragmentary mandibles and detached lower teeth	Number of fragmentary maxillae and detached upper teeth	Total	Minimum number of individuals
Węże I MF/185	251	137	388	71
Rębielice Królewskie II MF/1456	26	10	36	6
Rębielice Królewskie I MF/68	168	97	265	47
Zamkowa Dolna MF/1457	84	17	101	29
Kadzielnia MF/31	73	65	138	20
Kielniki MF/1458	6	7	13	3
Kamyk MF/80	79	53	132	17
Zalesiaki MF/1448	22	7	29	11
Kozi Grzbiet MF/1459	1	0	1	1

hand, A^4 is an equilateral triangle in section, it may be also heart-shaped or circular. Situated medially, it is quite invisible from the outside, its sight being intercepted by the parastyle of P^4.

The last upper antemolar, P^4, is a large molarized tooth, trapeziform in section, which is due to the fact that the well-developed parastyle is pushed forward and the protocone situated close to the parastyle. The protocone is always very distinct and has the shape of a cusp or a ridge which extends towards the centre. The hypocone may however vary in development. Situated always

very close to the protocone, it may be equally well developed or hardly visible at all, or, finally, intermediate between these extremes. The metacone is the highest cusp of P^4.

M^1 is characterized by its indistinct parastyle and rather weak hypocone. The cutting edge, running from the posterior part of the protocone to the slope of the metacone, is also poorly developed. In the occlusal view, M^2 is square or rectangular in shape. M^3 is reduced. The cingulum on P^4 and the molars is faint, best seen between the protocone and hypocone in M^1 and M^2. The emargination of the upper molars and P^4 is moderate to fairly conspicuous.

Mandible and lower dentition. The lower incisor, I_1, with its top fairly markedly bent upwards, has a smooth cutting edge. On the internal side of its crown there is a groove or two; the upper one, always present, is closed at both ends, whereas the lower groove, if there is any, is always open on the root side and often forms the extension of the root groove. Unicuspid A_1 is marked by a very shallow posterolingual basin, as a result of which this tooth may sometimes seem to be bicuspid. It completely overlies I_1. P_4 is a typical tooth of the *Soricinae*; it has a deep posterolingual basin, owing to which it always makes the impression of being bicuspid especially while seen from the labial side. It overlaps A_1 and hangs fairly conspicuously over the external side of the mandible. Both in A_1 and in P_4 the cingulum is poorly developed on the lingual side and sometimes the further to the front the more it decreases in size and becomes hardly visible, but is wide and more convex on the labial side.

M_1 is characterized by its distinct endoconid crest. Its hypoconid joins the trigonid in the depression between the protoconid and metaconid, the hypolophid is not connected with the endoconid, the metaconid lies posteriorly to the protoconid, and the valley between the protoconid and hypoconid descends externally down to the cingulum. The cingulum is rather wide and more convex on the labial side than it is in the antemolars and shows a tendency to disappear on the lingual side. M_2 is a diminished counterpart of M_1. M_3 is partly reduced, the endoconid being absent from its talonid in most cases. The endoconid, if present, is always very poorly developed.

The ascending ramus of the mandible forms an obtuse angle with its horizontal body, whereas the relatively narrow coronoid process bends forward and is deflected to the outside. The coronoid spicule is in the form of a more or less distinct furrow of various length and running obliquely from the anterior edge of this process to the posterior. The external temporal fossa is always shallow. The mental foramen lies in a small depression just under the posterior root of M_1, sometimes between its roots. The mandibular symphysis comes under M_1 and terminates between its metaconid and endoconid. The relatively shallow internal temporal fossa is usually in the form of a subisosceles triangle with rounded vertices or, sometimes, in the form of a trapezium. The upper articular surface of the condyloid process is narrow and it slightly widens in the medial part. The lower articular surface is turned more ventrally than it is in *Sorex* and, together with the lower condyle, is situated further to the front than it

is in most members of this tribe. In this connection it cannot be seen from the external side. This surface has a reniform depression in its upper edge. The interarticular surface is very wide as for a member of this tribe and it is not uniform throughout its length, but widens downwards. The superior pterygoid fossa is deep and not filled with osseous tissue to strengthen the articular process. The superior pterygoid spicule is small or missing and the angular process is short and not very wide.

Measurements (see Tables II and III).

Systematic position and occurrence. *Beremendia fissidens* may undoubtedly be included in the subfamily *Soricinae* on the basis of the structure of P_4, characterized by its distinct posterolingual basin and cingulum, which hangs over the root and the lateral surface of the mandible under the posterolabial root of the tooth to a greater extent than it does in other subfamilies, the structure of the articular process, whose articular surfaces join on the labial side, the structural details of M_1 (e.g. the metaconid situated posteriorly to the protoconid), the presence of pigmentation and the more posterior position of the mental foramen.

Although its interarticular surface on the condyloid process is very wide, Repenning (1967) includes this genus in the tribe *Neomyini*. He has been induced to do this by the presence of the bifid upper incisor, I^1, characteristic of nearly all forms of the Old World numbered in this tribe, the presence, also characteristic of its members, of the endoconid crest in M_1, the occurrence of rectangular M_2, the structural details of the condyloid process (e.g. the shape of the articular surfaces and the depth of the superior pterygoid fossa), the strong tendency for the coronoid process to bend forward, the place of the beginning of the zygomatic process posterior to M^2, etc.

In Poland *Beremendia fissidens* is known from the period from the Early Pliocene to the Cromerian Interglacial. Outside Poland it occurred in a large part of Europe. In German Federal Republic and Hungary it has also been found in many localities, referred to the same period as those in Poland. In recent years finds of *B. fissidens* were reported from German Federal Republic by Heller (1963), Koenigswald (1971) and Storch et al. (1973), from Czechoslovakia by Musil (1966), Fejfar (1964, 1966) and Rzebik-Kowalska (1972), from Hungary by Kretzoi (1962) and Janossy (1972, 1973), from Roumania by Terzea (1972, 1973), from Austria by Rabeder (1973, 1974), from Italy by Berzi et al. (1967) and van der Meulen (1973), from France by Chaline (1972) and from Holland by van der Meulen (1974).

Two other species of *Beremendia* mentioned beside *B. fissidens* in literature are *B. ucrainica* (Pidoplichko, 1956) and *B. sinensis* (Zdansky, 1928). *Beremendia ucrainica* has been described by Pidoplichko (1956) from the Middle Pleistocene of the Ukraine as *Blarina ucrainica* and next, according to Kretzoi's oral communication, mentioned by Repenning (1967) as a new species of the genus *Beremendia*. As far as can be seen from the picture and short description of *Blarina ucrainica*, this form does not differ from *Beremendia fissidens*. As

Beremendia fissidens (PETÉNYI) — dimensions of upper dentition

		Węże I				Rębielice Królewskie II				Rębielice Królewskie I				Zamkowa Dolna				Kadzielnia				Kielniki				Kamyk				Zalesiaki			
		min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n
I^1	L_1	3.03	3.37	3.69	4	3.45	3.67	4.02	3	3.25	3.54	3.79	4	—	—	—	0	3.49	3.67	3.78	3	3.55	3.58	3.61	2	3.80	3.94	4.18	3	3.51	3.52	3.54	2
	L_2	1.50	1.66	1.80	6	1.63	1.71	1.80	3	1.60	1.57	1.75	4	—	—	—	0	1.65	1.69	1.72	3	1.50	1.53	1.57	2	1.57	1.71	1.89	3	—	1.53	—	1
	W	2.00	2.12	2.37	6	2.28	2.37	2.48	3	2.26	2.31	2.46	4	—	—	—	0	2.18	2.28	2.44	3	2.30	2.38	2.46	2	2.41	2.53	2.68	3	—	2.31	—	1
A^1	L	1.59	1.60	1.61	2	—	—	—	0	1.23	1.39	1.56	2	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
	W	1.05	1.07	1.10	2	—	—	—	0	1.03	1.04	1.06	2	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
A^2	L	1.16	1.30	1.41	5	—	—	—	0	1.10	1.31	1.52	2	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
	W	0.92	1.01	1.06	5	—	—	—	0	1.00	1.00	1.01	2	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
A^3	L	0.71	0.76	0.82	2	—	0.90	—	1	—	0.88	—	1	—	—	—	0	0.95	1.06	1.18	2	—	—	—	0	—	—	—	0	—	—	—	0
	W	0.76	0.84	0.92	2	—	0.86	—	1	—	0.72	—	1	—	—	—	0	0.91	0.94	0.98	2	—	—	—	0	—	—	—	0	—	—	—	0
A^4	L	—	0.53	—	1	—	—	—	0	0.50	0.58	0.67	2	—	—	—	0	0.60	0.62	0.63	3	—	—	—	0	—	0.76	—	1	—	—	—	0
	W	—	0.56	—	1	—	—	—	0	0.53	0.64	0.76	2	—	—	—	0	0.62	0.63	0.65	3	—	—	—	0	—	0.73	—	1	—	—	—	0
P^4	L_1	2.15	2.21	2.26	6	2.22	2.49	2.76	2	2.26	2.40	2.65	4	2.48	2.54	2.62	6	2.48	2.54	2.61	6	—	—	—	0	2.65	2.66	2.67	2	2.45	2.55	2.61	3
	L_2	1.64	1.81	1.93	6	1.89	1.95	2.02	2	1.65	1.77	1.93	4	1.54	1.66	1.80	6	1.64	1.72	1.80	6	—	—	—	0	1.70	1.81	1.92	2	1.53	1.59	1.63	3
	W	2.42	2.51	2.58	6	2.69	2.73	2.78	2	2.41	2.57	2.76	4	2.50	2.58	2.63	6	2.55	2.61	2.69	6	—	—	—	0	2.76	2.80	2.84	3	2.45	2.65	2.82	3
M^1	L_1	2.14	2.26	2.36	7	2.51	2.52	2.53	2	2.31	2.44	2.62	9	2.28	2.40	2.57	9	2.43	2.49	2.55	5	—	—	—	0	2.39	2.51	2.73	6	2.31	2.35	2.45	4
	L_2	1.74	1.85	1.91	7	2.09	2.13	2.18	2	1.85	1.93	2.06	9	1.82	1.90	1.97	9	1.93	2.02	2.10	5	—	—	—	0	1.89	2.03	2.29	6	1.67	1.81	1.91	4
	W_2	2.40	2.48	2.56	7	2.69	2.74	2.79	2	2.43	2.65	2.87	9	2.39	2.56	2.68	9	2.54	2.63	2.73	5	—	—	—	0	2.54	2.62	2.75	6	2.42	2.53	2.68	4
M^2	L_1	1.88	1.96	2.04	6	—	2.12	—	1	1.95	2.07	2.18	8	1.87	2.05	2.23	2	2.00	2.03	2.09	3	—	2.06	—	1	1.93	2.03	2.13	2	—	—	—	0
	L_2	1.55	1.57	1.60	6	—	1.79	—	1	1.53	1.70	1.79	9	1.56	1.67	1.75	3	1.68	1.69	1.69	3	—	1.43	—	1	1.61	1.67	1.74	2	—	—	—	0
	W_1	2.27	2.34	2.39	6	—	2.51	—	1	2.29	2.47	2.73	9	2.32	2.50	2.61	3	2.53	2.55	2.58	3	—	2.58	—	1	2.45	2.53	2.61	2	—	—	—	0
	W_2	1.92	1.96	2.00	6	—	2.08	—	1	1.96	2.11	2.19	7	1.82	1.96	2.11	2	2.14	2.16	2.19	3	—	1.93	—	1	1.79	1.93	2.08	2	—	—	—	0
M^3	L	0.73	0.82	0.88	6	—	0.91	—	1	—	—	—	0	—	—	—	0	—	0.95	—	1	—	—	—	0	—	—	—	0	—	—	—	0
	W	1.59	1.62	1.65	6	—	1.69	—	1	—	—	—	0	—	—	—	0	—	1.62	—	1	—	—	—	0	—	—	—	0	—	—	—	0

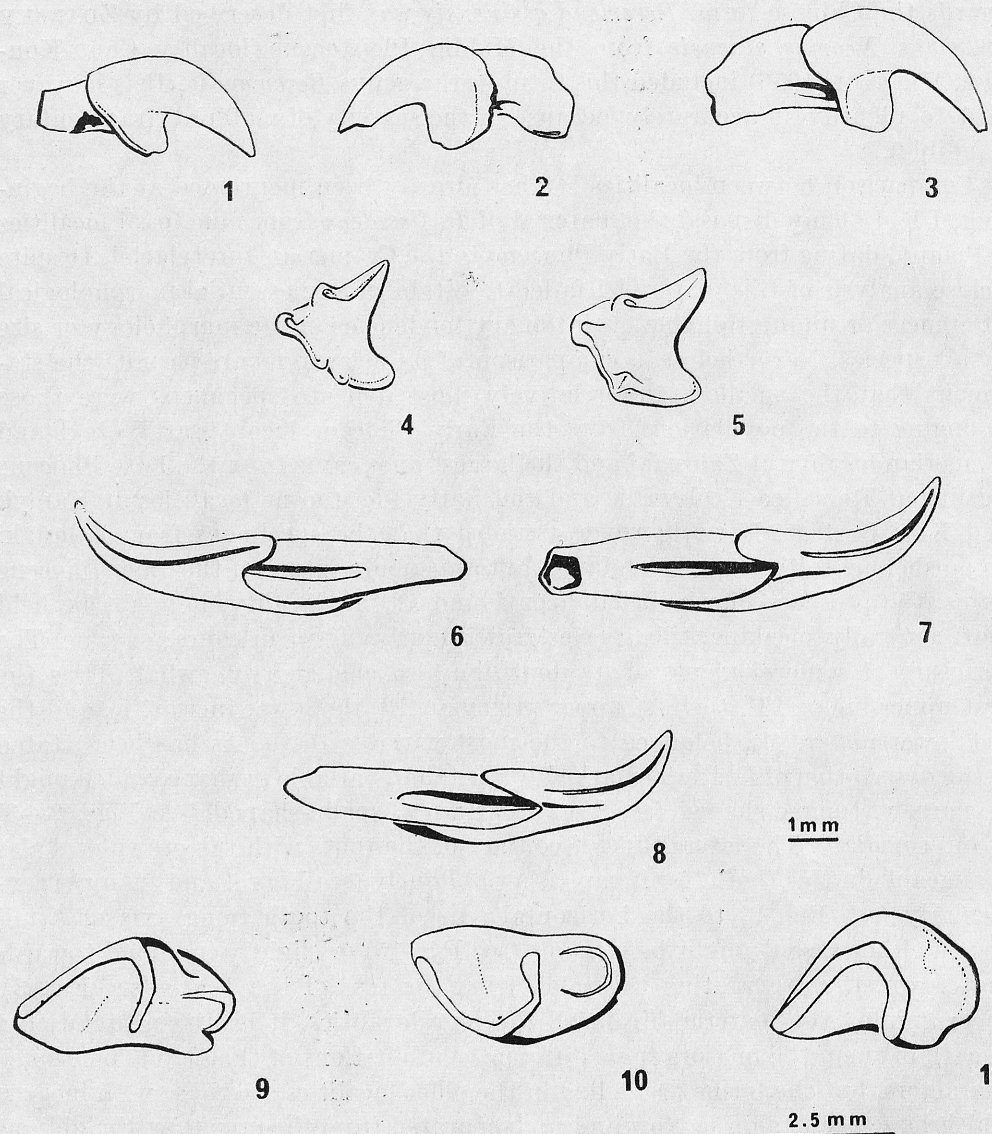
Beremendia fissidens (PETÉNYI) — dimensions of mandibles and lower dentition

		Węże I				Rębielice Królewskie II				Rębielice Królewskie I				Zamkowa Dolna				Kadzielnia				Kielniki				Kamyk				Zalesiaki				Kozi Grzbiet			
		min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n
I_1	L	5.94	6.17	6.50	6	5.98	6.47	7.11	3	6.04	6.27	6.55	5	5.65	6.50	0.07	19	6.20	6.43	6.72	4	—	—	—	0	6.30	6.60	6.92	2	5.94	6.10	6.27	2	—	—	—	0
A	L	1.20	1.27	1.34	4	1.39	1.43	1.48	2	1.25	1.42	1.56	4	1.40	1.44	1.47	3	—	—	—	0	—	1.58	—	1	—	—	—	0	—	1.38	—	1	—	—	—	0
	W	0.87	0.91	0.94	4	0.99	1.03	1.08	2	0.91	1.00	1.07	4	1.03	1.04	1.04	3	—	—	—	0	—	1.01	—	1	—	—	—	0	—	1.02	—	1	—	—	—	0
P_4	L	1.70	1.76	1.91	5	1.60	1.77	1.87	3	1.75	1.88	2.04	6	1.84	1.90	1.99	6	1.68	1.70	1.73	2	1.93	1.95	1.98	3	—	—	—	0	1.82	1.96	2.07	3	—	—	—	0
	W	1.07	1.17	1.28	5	1.23	1.25	1.30	3	1.18	1.27	1.50	6	1.28	1.30	1.33	6	1.16	1.20	1.25	2	1.22	1.27	1.36	3	—	—	—	0	1.21	1.26	1.29	3	—	—	—	0
M_1	L	2.21	2.28	2.36	7	2.41	2.47	2.56	8	2.36	2.48	2.57	10	2.31	2.44	2.60	18	2.35	2.42	2.50	4	2.38	2.43	2.49	3	2.50	2.57	2.61	5	2.29	2.37	2.53	9	—	2.48	—	1
	W_1	1.17	1.26	1.32	7	1.34	1.39	1.50	8	1.31	1.40	1.49	10	1.37	1.45	1.52	18	1.35	1.43	1.52	4	1.33	1.42	1.47	3	1.43	1.52	1.60	5	1.31	1.40	1.50	9	—	1.45	—	1
	W_2	1.28	1.35	1.40	7	1.41	1.48	1.60	8	1.43	1.51	1.60	10	1.42	1.52	1.59	18	1.39	1.59	1.62	5	1.44	1.49	1.52	3	1.53	1.60	1.65	5	1.32	1.44	1.53	9	—	1.53	—	1
M_2	L	2.00	2.05	2.12	4	2.09	2.15	2.21	7	2.17	2.23	2.34	10	1.98	2.11	2.20	15	2.05	2.10	2.17	5	2.05	2.05	2.06	2	2.11	2.15	2.23	5	1.92	2.01	2.20	9	—	2.14	—	1
	W_1	1.16	1.19	1.22	4	1.24	1.33	1.43	8	1.33	1.37	1.45	10	1.24	1.30	1.38	15	1.25	1.34	1.38	5	1.30	1.31	1.33	2	1.30	1.35	1.42	5	1.20	1.29	1.40	9	—	1.34	—	1
	W_2	1.14	1.17	1.20	4	1.20	1.28	1.39	7	1.23	1.29	1.39	10	1.24	1.29	1.34	15	1.17	1.28	1.35	5	1.26	1.26	1.27	2	1.26	1.30	1.33	5	1.13	1.21	1.34	9	—	1.28	—	1
M_3	L	1.51	1.57	1.65	3	1.63	1.74	1.84	4	1.70	1.79	1.92	8	1.65	1.69	1.75	8	1.56	1.62	1.69	2	1.53	1.54	1.55	2	1.66	1.67	1.71	4	1.47	1.50	1.52	6	—	1.68	—	1
	W_1	0.86	0.87	0.88	3	0.89	0.93	0.98	4	0.87	0.94	1.08	8	0.89	0.93	0.96	8	0.87	0.88	0.89	3	0.85	0.87	0.89	2	0.92	0.95	0.99	4	0.82	0.87	0.93	6	—	0.86	—	1
	W_2	0.65	0.67	0.70	3	0.69	0.77	0.87	4	0.74	0.80	0.91	8	0.70	0.73	0.76	8	0.68	0.72	0.76	2	0.73	0.76	0.79	2	0.72	0.74	0.78	4	0.60	0.69	0.75	6	—	0.71	—	1
M_1—M_3	L	5.72	5.84	6.06	3	6.03	6.30	6.59	4	6.16	6.38	6.70	8	6.05	6.17	6.38	6	—	—	—	0	5.89	5.94	5.99	2	6.27	6.35	6.42	4	5.68	5.81	5.92	3	—	—	—	0
Height of mandible below M_1		2.51	2.65	2.89	6	2.55	2.87	3.00	5	2.60	2.82	3.02	6	2.65	2.76	2.90	9	2.67	2.69	2.71	2	—	2.81	—	1	2.65	2.76	2.88	2	2.37	2.56	2.64	4	—	3.00	—	1
Height of ascending ramus		5.98	6.08	6.16	3	6.32	6.52	6.81	5	6.30	6.49	6.75	7	6.00	6.44	6.80	7	6.06	6.30	6.72	3	6.61	6.67	6.73	2	6.74	6.84	6.95	2	5.86	6.17	6.50	6	—	—	—	0
Length of mandible without J_1		—	—	—	0	—	14.70	—	1	14.0	14.54	15.08	2	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
Length of mandible with I_1		—	—	—	0	—	17.63	—	1	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
Height of proc. condyloideus		2.48	2.55	2.68	3	2.73	2.87	2.98	5	2.84	3.00	3.39	8	2.60	2.94	3.33	8	2.76	2.87	3.05	4	3.09	3.12	3.15	2	3.05	3.10	3.15	2	2.56	2.86	2.96	6	—	—	—	0
Length of its lower art. facet		3.47	3.52	3.55	3	3.68	3.83	4.08	5	3.25	3.59	3.91	8	3.18	3.52	3.75	7	3.15	3.40	3.60	3	3.43	3.43	3.44	2	3.35	3.43	3.52	2	2.92	3.12	3.40	6	—	—	—	0

regards the Chinese form, *Beremendia sinensis* was first described by ZDANSKY (1928) as *Neomys sinensis* from the Middle Pleistocene locality Chou-Kou-Tien. KRETZOI (1956) included this form in the genus *Beremendia*. It is however hard to identify it accurately because of the scarcity of material (fragmentary mandible).

Comparison between localities. As has already been mentioned at the beginning, I had at my disposal the material of *B. fissidens* from nine fossil localities in Poland, dating from the Early Pliocene to the Cromerian Interglacial. Despite a close analysis of this material I failed to establish any essential morphological differences or unquestionable evolutionary tendencies in the morphology or size of this species. Nevertheless, a comparison of its measurements permits the statement that the smallest and relatively most delicate specimens were those belonging to the populations from the Early Pliocene locality at Węże I and Cromerian locality at Zalesiaki and the largest ones came from the Late Pliocene locality at Rębielice Królewskie and the Early Pleistocene localities at Kamyk and Kozi Grzbiet. If we however assumed that the specimens from Zalesiaki do not belong to the Cromerian fauna but are an admixture of the older Pliocene forms, the presence of which has been found at this locality, it might be held that, generally speaking, this species grew slightly bigger in course of time. The structure of some elements of its dentition also changed somewhat. Thus the first upper incisor, I^1, the last upper premolar, P^4, the lower incisor, I_1, and the last lower molar, M_3, belonged to the most variable teeth. As has been stated in the description of I^1, it was marked by its talon, variable in shape, which might be narrow, tongue-shaped (see Fig. 1) or wide, spade-shaped (see Figs. 2—3) or intermediate. The lateral line of contact of the roots with the crown was also changeable in this tooth, for it ran either obliquely (see Figs. 1 and 3) or perpendicularly (see Fig. 2) to the horizontal axis of the tooth (long axis of skull) and in either case it might be straight (see Fig. 15) or slightly indented towards the crown, thus separating the talon from the rest of the tooth (see Fig. 3). In examining the materials from all the nine localities, it has been found that in each of them the incisors show different combinations of the above-mentioned characters, but the forms prevailing in the older localities are those with incisors which have their talon narrow and not separated from the crown by the oblique line of junction of the root and crown, whereas the younger the locality, the larger is the number of incisors with the broad rectangular talon and the less oblique line of junction of the root and crown, which line is indented here and makes the talon very distinct.

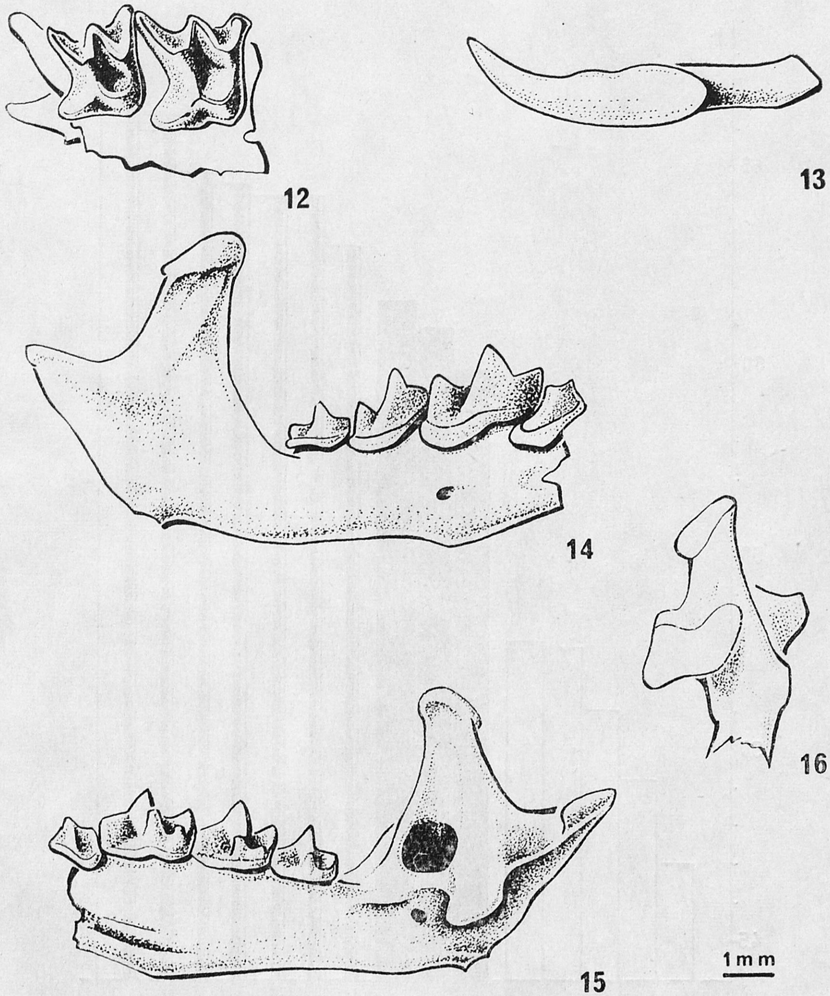
On the other hand, P^4 may be relatively broad, when its parastyle, protocone and sometimes also hypocone lie almost one under another, so that they form the anterolingual angle which is nearly a right angle (see Fig. 5), or narrow and tongue-shaped, when the protocone is shifted to the back in relation to the parastyle and the hypocone in relation to the protocone, the last two cusps being less well-developed (see Fig. 4). On comparison of the materials from all the localities we may state that although both types of P^4 and all the intermediate



Figs. 1—11. Variability of dental morphology in *Beremendia fissidens*. Explanations in text (pp. 365—368)

stages occur in all the localities under study, the narrow tongue-shaped type predominates in the older forms and the younger the locality the more numerous are the broader premolars.

Some small changes may also be found in the structure of I_1. In the specimens from Węże I the first incisor has only the upper groove on the internal side (see Fig. 6), whereas in all the other localities this tooth is characterized by the presence of two grooves, the upper and the lower. In the incisors from Rębielice



Figs. 12—16. *Beremendia minor* n. sp. from Rębielice Królewskie I. 12 — right maxillary fragment with M^1—M^2, specimen no MF/1513/6. 13 — left I_1, specimen no MF/1513/9. 14—15 — right half of mandible with P_4—M_3, holotype, no MF/1513/1. 16 — processus condyloideus of the same mandible

Królewskie I and II and Zamkowa Dolna these grooves lie relatively far from each other (see Fig. 7), and in the remaining specimens, i.e. those from Kadzielnia, Kielniki, Kamyk, Zalesiaki and Kozi Grzbiet, the lower groove comes nearer the upper one and seems to lie in the extension of the root groove (see Fig. 8). M_3 has been thought hitherto to be reduced and devoid of the distinct endoconid on its talonid. Investigating long series of specimens of this species, one can however see the endoconid, faintly but clearly marked, on some molars from Węże I, Rębielice Królewskie I and II and Zamkowa Dolna (see Fig. 9). Nevertheless, it actually seems to disappear completely in specimens from the younger localities, but because of the small number of specimens examined this

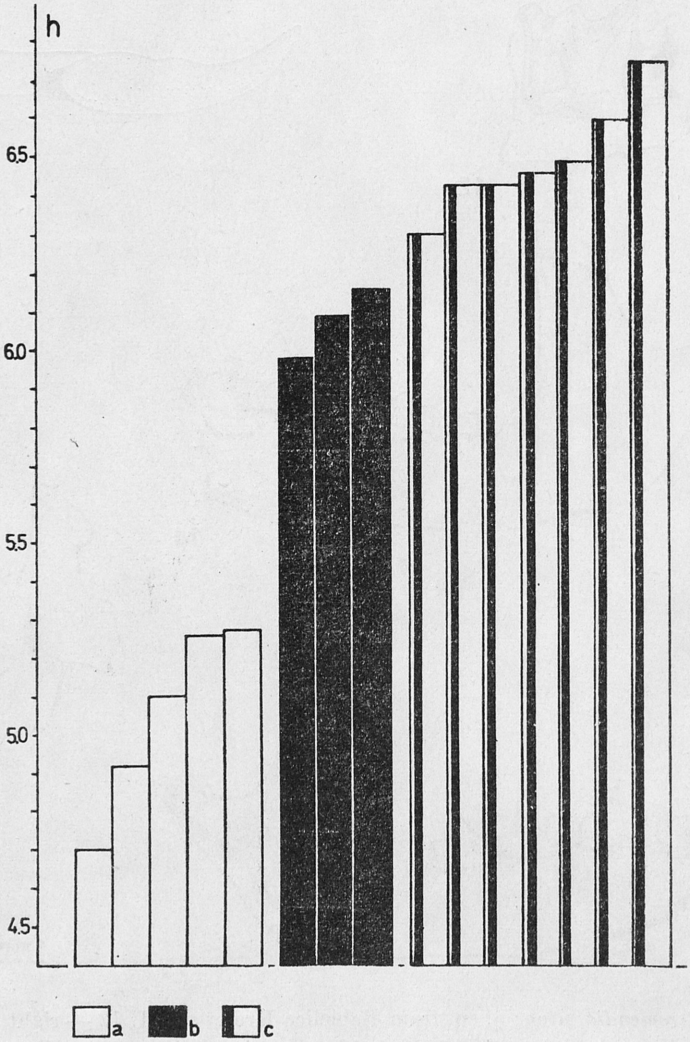


Fig. 17. Height of processus coronoideus in *Beremendia* (in mm). a — *Beremendia minor* n. sp. from Rębielice Królewskie I (5 specimens). b — *B. fissidens* from Węże I (3 specimens). c — *B. fissidens* from Rębielice Królewskie I (7 specimens)

cannot be claimed for a certainty (see Fig. 10). Finally in a few specimens the talonid itself is not developed (see Fig. 11).

The tendency for the talon to grow bigger by changing its size and shape in I^1 and for P^4 to increase owing to changes in the arrangement of the protocone and hypocone coincides with the general tendency shown by this animal to increase its dimensions slightly, but even then it generally seems that this species was extremely conservative throughout the period of its existence, and so for several million years, and all the changes that occurred in its structure were slight, noticeable only at close investigation.

Beremendia minor n.sp.
(Figs. 12—16)

Holotype: fragmentary right mandible with P_4—M_3 and processes except angular process (ZZSiD, No. MF/1513).

Type locality and stratum: Rębielice Królewskie I, Lower Villafranchian.

Derivation of name: *minor* — smaller than species *B. fissidens*.

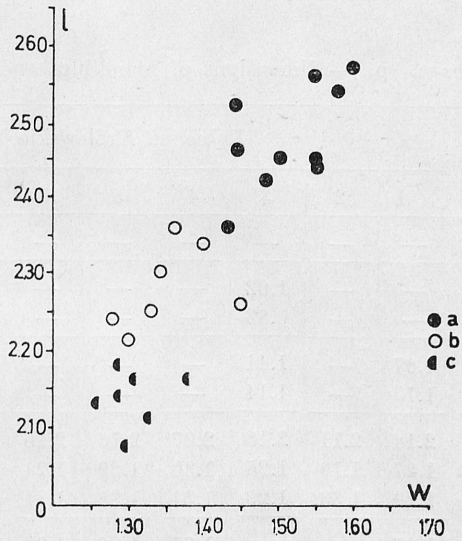


Fig. 18. Scatter-diagram showing the length (l) and width (w) of M_1 in *Beremendia fissidens* from Rębielice Królewskie I (a), *B. fissidens* from Węże I (b) and *B. minor* n. sp. from Rębielice Królewskie I (c) (in mm.)

Table IV

Beremendia minor n. sp., — dimensions of upper dentition

Locality		Rębielice Królewskie I						
Specimen		1	2	3	4	5	6	7
I^1	L_1	3.72	3.09	3.07	3.57	3.25	—	—
	L_2	1.90	1.40	1.38	1.75	1.56	—	—
	W	2.17	1.83	1.83	2.25	2.37	—	—
M^1	L_1	—	—	—	—	—	2.32	2.31
	L_2	—	—	—	—	—	1.85	1.78
	W_2	—	—	—	—	—	2.40	2.34
M^2	L_1	—	—	—	—	—	1.90	1.93
	L_2	—	—	—	—	—	1.50	1.50
	W_1	—	—	—	—	—	2.22	2.25
	W_2	—	—	—	—	—	1.88	1.91

Material. Rębielice Królewskie I — I^1, fragmentary left and right maxillae with M^1 and M^2, fragmentary left mandible with M_1 and processes except the angular process, and 9 fragments of right mandibles, partly with processes except the angular process and all together providing a full set of the lower teeth except I_1.

Description and systematic position. The morphological structure of *Beremendia minor* is an exact counterpart of the structure of *Beremendia*

Table V

Beremendia minor n. sp., — dimensions of mandibles and lower dentition

Locality Specimen		Rębielice Królewskie I								
		1	2	3	4	5	6	7	8	9
I_1	L	—	—	—	—	—	—	—	—	5.00
A_1	L	—	—	1.02	—	—	—	—	—	—
	W	—	—	0.83	—	—	—	—	—	—
P_4	L	1.67	—	1.41	—	—	—	—	—	—
	W	1.13	—	1.14	—	—	—	—	—	—
M_1	L	2.14	2.11	2.18	2.07	2.16	2.16	2.13	—	—
	W_1	1.27	1.19	1.25	1.30	1.29	1.24	1.21	—	—
	W_2	1.29	1.33	1.29	1.34	1.38	1.31	1.26	—	—
M_2	L	1.87	—	—	1.85	1.85	1.93	1.86	1.80	—
	W_1	1.12	—	—	1.19	1.19	1.13	1.07	1.21	—
	W_2	1.08	—	—	1.08	1.12	1.17	1.04	1.12	—
M_3	L	1.43	—	—	—	—	1.53	1.45	—	—
	W_1	0.86	—	—	—	—	0.84	0.83	—	—
	W_2	0.75	—	—	—	—	0.74	0.74	—	—
M_1—M_3	L	5.23	—	—	—	—	5.37	5.12	—	—
Height of mandible below M_1		2.67	2.43	—	—	—	—	—	—	—
Height of ascending ramus		5.26	5.10	—	4.70	5.27	—	—	4.92	—
Length of mandible without I_1		—	—	—	—	—	—	—	—	—
Length of mandible with I_1		—	—	—	—	—	—	—	—	—
Height of processus condyloideus		2.55	2.62	—	2.36	—	—	—	2.41	—
Length of its lower articular facet		3.53	3.27	—	3.00	—	—	—	3.10	—

fissidens (PETÉNYI, 1864), in connection with which its membership in the genus *Beremendia* does not rouse doubt. However, the dimensions of this species are much smaller than those of both the members of *B. fissidens* from the same locality and the smallest specimens of this last species from the Pliocene locality at Węże I. As the difference in size is conspicuous, the dimensions of the two forms do not overlap (see Figs. 17—18), and they occur in one and same locality, the small form has been included in a separate species.

Measurements (see Tables IV and V).

Discussion. A large number of specimens morphologically identical with *B. fissidens* but of much smaller size have been found only in one of the nine localities containing remains of this species. The occurrence of a small form of *Beremendia* is also mentioned by FEJFAR (1964) from Hajnačka in Czechoslovakia, which corresponds in age with Rębielice Królewskie. FEJFAR describes them as *Beremendia* sp. *Beremendia* from Schernfeld in Austria, the locality also of a similar age, described by DEHM (1962) as *B. fissidens*, seems to be fairly small as well. Since both those authors give a very small number of measurements, comparison is rather hard. None the less, it seems that in the Upper Pliocene there existed two forms side by side, a large and a small, and that the small form became extinct relatively early, being unable to defy competition with the more well-adapted large form, which persisted to the Cromerian Interglacial.

Tribe *Blarinini* STIRTON, 1930

Genus *Blarinoides* SULIMSKI, 1959

Blarinoides mariae SULIMSKI, 1959

(Figs.19—20, 22, 24,36—38)

1959 — *Blarinoides mariae* n. sp., A. SULIMSKI, Pliocene insectivores..., pp. 144—148, Pl. II, Fig. 4 a—b, Pl. III, Fig. 6 a—c, Text fig. 4, 2a—f.

1960 — *Blarinoides mariae* SULIMSKI, 1959, K. KOWALSKI, Pliocene insectivores and rodents..., pp. 169—170, Pl. XX, Fig. 1.

1962 — *Blarinoides mariae* SULIMSKI, 1959, A. SULIMSKI, Supplementary studies..., pp. 474—476.

1962 — *Blarinoides mariae* SULIMSKI, 1959, A. SULIMSKI, O nowym znalezisku..., p. 221.

1964 — *Blarinoides mariae* SULIMSKI, 1959, K. KOWALSKI, Palaeoecology of mammals..., p. 77.

Material. A list of materials is given in Table VI. The minimum numbers of specimens at each locality have been estimated in the same way as for *Beremendia fissidens*.

Description. Rostral part of the skull. In profile, it shows a large triangular depression over the alveolar margin. It begins above A^1 and ends between A^3 and A^4. The beginning of the oval or round infraorbital foramen lies above the metacone of P^4 and its end at the line of contact of P^4 and M^1. The lacrimal

Table VI

Blarinoides mariae SULIMSKI — material

Locality	Number of fragmentary mandibles and detached lower teeth	Number of fragmentary maxillae and detached upper teeth	Total	Minimum number of individuals
Podlesice MF/1514	1	0	1	1
Węże I MF/186	181	84	265	51
Rębielice Królewskie II MF/1515	17	9	26	4
Rębielice Królewskie I MF/67	117	88	205	37
Zamkowa Dolna MF/1516	17	3	19	10
Kadzielnia MF/1517	2	0	2	1
Kamyk MF/1518	6	1	7	3

foramen is small and situated at the level of the lower half of the infraorbital foramen. The palatine foramina are also small. Their first, larger, pair lies between A^1—A^1, and the second, smaller one, between M^1—M^1. The short zygomatic process, seen from below, stretches in the extension of the mesostyle of M^2. In the region of the first upper incisors the maxillary bones are slightly swollen. The teeth are pigmented. If the bones and teeth were not decolorized or coloured black in the course of fossilization, the pigment is red, dark red or almost black, especially in the top portions of the teeth.

The dental formula is $\frac{1 - 6 - 3}{1 - 2 - 3} = 32$

Upper dentition. I^1 is massive, nonbifid, with a large square talon. The lateral line of root-crown junction runs almost perpendicularly to the long axis of the skull, it is straight, slightly convex, or bent to separate the talon. On the labial

side of I^1 is the wide flat cingulum. The antemolars except P^4 are unicuspid. A^1 and A^2 are nearly the same size, though A^2 may be somewhat larger than A^1. A^3 is half the size of the first two antemolars and A^4 at most half the size of A^3 and, being covered by the parastyle of P^4, it is only partly seen from the external side of the mandible. Tiny A^5 is quite invisible from the external side, as it is utterly hidden behind the parastyle of the last antemolar. In the occlusal view A^4 and A^5 are triangular in shape. The cingulum of the first five antemolars is distinct only on their labial side, whereas on the lingual side there occur posterolingual cusps, which are the most dinctinct in A^1 and A^2. P^4, big and molarized, is characterized by its large parastyle and very well developed lingual portion. The parastyle is so large that if A^4 and A^5 are wanting, it covers both their alveoli nearly completely. As regards the lingual portion of this tooth, the protocone and hypocone, which lie close to each other, form a strong anterolingual angle, both these cusps being always very well developed. In addition to them an accessory cingular cusp, often also very well developed, can be seen behind the hypocone on the internal side of the tooth. The highest cusp of P^4 is the metacone. M^1, the other big tooth besides P^4, has its parastyle relatively wide and hypocone always distinct. The ridge which extends between the protocone and metacone and closes the valley situated amidst the paracone, protocone, metacone and mesostyle is however low even though distinct. M^2 is a trapezium in outline, as the line that joins the parastyle, mesostyle and metastyle runs obliquely to the long axis of the skull. The parastyle is situated farthest from the axis and the metastyle nearest it. The occlusal view shows the zygomatic process in the extension of the mesostyle. M^3 is reduced. The emargination of P^4 and the upper molars is slight. The cingulum is distinct only on their posterior edge.

Mandible and lower dentition. The long and robust lower incisor, I_1, is marked by the presence of three distinct lobes on its cutting edge. The first lobe, situated nearest the root, is small, the second is very conspicuous and the third, like the first, is less well developed. The crown of this tooth is smooth on the internal side, and the depression in its root does not extend on to the crown. The first antemolar, which completely overlies I_1 is unicuspid and has only a very slight posterolingual basin. On the other hand, P_4, large and robust, makes the impression of being swollen, because, as in the subfamily *Crocidurinae*, it has no posterolingual basin at all. The very top of this tooth is bifid and, if worn, its occlusal surface is a narrow-waisted oblong. The wide and flat cingulum runs all round A_1 and P_4, decreasing in size only towards the front. The first lower molar is characterized by its large endoconid and the lack of the endoconid crest. Moreover, its hypoconid joins the trigonid in the depression between the protoconid and metaconid, the hypolophid is not joined to the endoconid, the metaconid lies posteriorly to the protoconid, and the external valley between the protoconid and hypoconid comes down to the very margin of the cingulum, which, as in A_1 and P_4 is very wide on both the labial and the lingual side. It is widest under the protoconid and narrowest on the anterior and posterior sides. M_2 is a diminished counterpart of M_1. The last molar, about a third of M_1 in

Table VII

Blarinoides mariae SULIMSKI — dimensions of upper dentition

		Węże I				Rębielice Królewskie II				Rębielice Królewskie I				Zamkowa Dolna				Kamyk			
		min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n
I^1	L_1	3.00	3.23	3.36	4	3.05	3.20	3.30	3	3.15	3.31	3.51	5	—	—	—	0	—	—	—	0
	L_2	1.37	1.49	1.58	8	1.37	1.56	1.67	3	1.41	1.49	1.58	5	—	—	—	0	—	—	—	0
	W	1 95	2.09	2.25	8	1.96	2.08	2.21	3	1.98	2.14	2.24	5	—	—	—	0	1.87	1.87	1.87	1
A^1	L	1.34	1.46	1.59	2	1.61	1.61	1.61	1	1.50	1.52	1.54	2	—	—	—	0	—	—	—	0
	W	1.00	1.07	1.15	2	1.16	1.16	1.16	1	0.97	1.02	1.07	2	—	—	—	0	—	—	—	0
A^2	L	1.46	1.53	1.61	3	1.43	1.43	1.43	1	1.37	1.49	1.61	3	—	—	—	0	—	—	—	0
	W	1.09	1.12	1.15	3	1.23	1.23	1.23	1	1.04	1.08	1.10	3	—	—	—	0	—	—	—	0
A^3	L	0.90	0.93	0.96	3	0.86	0.86	0.87	2	0.82	0.85	0.89	4	—	—	—	0	—	—	—	0
	W	0.98	1.03	1.09	3	0.97	1.00	1.04	2	0.91	0.94	1.00	5	—	—	—	0	—	—	—	0
A^4	L	—	—	—	0	—	—	—	0	0.54	0.58	0.67	5	—	—	—	0	—	—	—	0
	W	0.69	0.76	0.84	2	—	—	—	0	0.70	0.74	0.80	6	—	—	—	0	—	—	—	0
A^5	L	—	—	—	0	—	—	—	0	0.46	0.51	0.58	4	—	—	—	0	—	—	—	0
	W	0.58	0.63	0.69	2	—	—	—	0	0.57	0.62	0.70	4	—	—	—	0	—	—	—	0
P^4	L_1	2.39	2.65	2.77	8	2.60	2.65	2.75	3	2.32	2.47	2.62	8	2.42	2.42	2.42	1	—	—	—	0
	L_2	1.74	1.82	1.88	8	1.73	1.81	1.87	3	1.68	1.77	1.87	8	1.85	1.85	1.85	1	—	—	—	0
	W	2.53	2.64	2.69	9	2.46	2.60	2.67	3	2.37	2.54	2.66	8	2.62	2.62	2.62	1	—	—	—	0
M^1	L_1	2.11	2.25	2.35	8	2.19	2.33	2.48	5	2.22	2.29	2.35	8	2.32	2.36	2.40	2	—	—	—	0
	L_2	1.85	2.01	2.12	8	2.00	2.10	2.25	5	1.95	2.05	2.13	8	2.01	2.10	2.19	2	—	—	—	0
	W	2.46	2.54	2.62	8	2.48	2.54	2.63	5	2.40	2.50	2.62	8	2.56	2.59	2.62	2	—	—	—	0
M^2	L_1	1.57	1.66	1.72	5	1.58	1.63	1.73	3	1.64	1.69	1.73	5	—	—	—	0	—	—	—	0
	L_2	1.44	1.50	1.58	6	1.46	1.49	1.53	3	1.52	1.54	1.58	5	—	—	—	0	—	—	—	0
	W_1	2.26	2.41	2.46	5	2.43	2.51	2.67	3	2.40	2.46	2.53	5	—	—	—	0	—	—	—	0
	W_2	1.63	1.71	1.76	5	1.67	1.78	1.97	3	1.64	1.73	1.85	5	—	—	—	0	—	—	—	0
M^3	L	0.69	0.69	0.69	1	0.65	0.65	0.65	1	0.77	0.77	0.77	1	—	—	—	0	—	—	—	0
	W	1.39	1.39	1.39	1	1.35	1.35	1.35	1	1.32	1.32	1.32	1	—	—	—	0	—	—	—	0

Blarinoides mariae Sulimski — dimensions of mandibles and lower dentition

		Podlesice				Węże I				Rębielice Królewskie II				Rębielice Królewskie I				Zamkowa Dolna				Kadzielnia				Kamyk			
		min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n	min.	avg.	max.	n
I_1	L	7.28	7.28	7.28	1	6.70	7.11	7.35	9	6.62	7.13	7.82	4	7.24	7.50	8.24	7	7.34	7.34	7.34	2	—	—	—	0	—	—	—	0
A	L	1.34	1.34	1.34	1	1.31	1.33	1.38	5	—	—	—	0	1.24	1.41	1.52	4	1.30	1.30	1.30	1	—	—	—	0	—	—	—	0
	W	1.07	1.07	1.07	1	1.03	1.08	1.16	5	—	—	—	0	1.00	1.07	1.17	4	1.03	1.03	1.03	1	—	—	—	0	—	—	—	0
P_4	L	2.11	2.11	2.11	1	1.94	2.15	2.36	7	—	—	—	0	1.98	2.16	2.36	7	1.99	2.01	2.03	2	—	—	—	0	2.00	2.00	2.00	1
	W	1.54	1.54	1.54	1	1.41	1.49	1.55	7	—	—	—	0	1.36	1.42	1.46	7	1.42	1.47	1.53	2	—	—	—	0	1.30	1.30	1.30	1
M_1	L	2.38	2.38	2.38	1	2.30	2.40	2.56	9	2.26	2.32	2.37	3	2.11	2.29	2.41	10	2.26	2.39	2.58	12	2.24	2.32	2.40	2	2.19	2.42	2.64	4
	W	1.49	1.49	1.49	1	1.45	1.53	1.62	8	1.42	1.48	1.53	3	1.37	1.48	1.60	10	1.42	1.54	1.83	12	1.46	1.48	1.50	2	1.49	1.56	1.65	5
M_2	L	1.93	1.93	1.93	1	1.84	1.91	1.95	8	1.85	1.90	1.93	5	1.70	1.84	1.91	8	1.84	1.89	1.94	3	1.90	1.90	1.90	1	2.17	2.17	2.17	1
	W	1.26	1.26	1.26	1	1.17	1.24	1.30	8	1.16	1.20	1.26	5	1.17	1.23	1.36	8	1.24	1.26	1.27	3	1.17	1.17	1.17	1	1.30	1.30	1.30	1
M_3	L	1.23	1.23	1.23	1	1.28	1.35	1.46	6	1.41	1.41	1.41	1	1.25	1.30	1.36	6	1.31	1.35	1.39	2	—	—	—	0	—	—	—	0
	W	0.80	0.80	0.80	1	0.75	0.80	0.89	6	0.82	0.82	0.82	1	0.73	0.80	0.90	6	0.75	0.78	0.81	2	—	—	—	0	0.78	0.78	0.78	1
M_1—M_3	L	5.59	5.59	5.59	1	5.42	5.53	5.67	5	5.57	5.57	5.57	1	5.17	5.43	5.65	6	5.42	5.50	5.58	2	—	—	—	0	—	—	—	0
Height of mandible below M_1		2.62	2.62	2.62	1	2.34	2.54	2.70	6	—	—	—	0	2.15	2.36	2.58	4	2.51	2.60	2.65	3	—	—	—	0	2.38	2.64	2.90	2
Height of ascending ramus		—	—	—	0	6.72	6.96	7.09	4	6.20	6.38	6.57	4	5.91	6.43	7.03	6	6.60	6.67	6.73	3	—	—	—	0	—	—	—	0
Length of mandible without I_1		12.58	12.58	12.58	1	13.71	13.71	13.71	1	—	—	—	0	11.92	12.02	12.12	2	—	—	—	0	—	—	—	0	—	—	—	0
Length of mandible with I_1		16.24	16.24	16.24	1	16.81	16.81	16.81	1	—	—	—	0	15.00	15.00	15.00	1	—	—	—	0	—	—	—	0	—	—	—	0
Height of proc. condyloideus		—	—	—	0	3.30	3.52	3.63	5	3.10	3.30	3.68	5	2.92	3.27	3.52	6	3.15	3.26	3.36	4	—	—	—	0	—	—	—	0
Length of its lower art. facet		—	—	—	0	2.79	2.97	3.12	5	2.72	2.88	3.02	5	2.54	2.73	2.88	6	2.89	2.93	2.97	4	—	—	—	0	—	—	—	0

size, has a distinct though small endoconid. On the external side its cingulum is more or less equal throughout the length of the tooth.

The ascending ramus of the mandible forms an obtuse angle with its horizontal body. The coronoid process, broad and marked by its distinct coronoid spicule, is slightly bent forwards. The external temporal fossa is shallow or medium deep. The mental foramen lies in a depression between the roots or under the posterior root of M_1. The mental symphysis comes under M_1 and ends at the height of the top of its metaconid. The small internal temporal fossa is a square with rounded corners or sometimes approximates to a circle in outline. The condyloid process is robust, the interarticular surface very wide, and its emargination vestigial. The narrow upper articular surface widens only in the medial part. The lower articular surface is bent on its upper margin in a kidney-like way towards the lingual side and is turned ventrally. Neither it nor the lower condyle can be seen from the labial side. The superior pterygoid fossa is moderately deep and the superior pterygoid spicule small. The angular process has not been preserved.

Measurements (see tables VII and VIII).

Systematic position and occurrence. The same characters that permit the inclusion of *Beremendia fissidens* in the subfamily *Soricinae* (see p. 364) also refer *Blarinoides mariae* to this subfamily. The structure of P_4 in *Blarinoides mariae*, devoid of the posterolingual basin, as in the members of the subfamily *Crocidurinae*, does not prevent this, because such a state is occasionally met with in the members of the subfamily *Soricinae* with sturdy jaws and teeth. P_4 of the *Soricinae* and, among them, of *Blarinoides mariae* differs from P_4 typical of the *Crocidurinae* in its cingulum, which in the posterolabial part of the tooth hangs heavily over the root and the external side of the mandible. On the other hand, such characters as nonbifid I^1, trapezoid M^2, the deflection of the coronoid process from the long axis of the mandible to the outside, the presence of the robust endoconid with the simultaneous lack of the endoconid crest on M_1, the reduction of M_3 and the great distance between the articular surfaces, the wide interarticular surface with a small lingual emargination on the condyloid process, etc. indicate the membership of *Blarinoides mariae* in the tribe *Blarinini*.

The single specimen of *Blarinoides mariae* found in the materials from Podlesice suggests that this species occurred in Poland as early as the Late Miocene. This would be at the same time the oldest find of this soricid in Europe. However, it did not persist until the Cromerian Interglacial, but disappeared in the cool period preceding it. The finding of *Blarinoides mariae* in the Pliocene deposits in France was reported by GUERIN et al. in 1971. The other finds of this species in Europe are referred to the Lower, Middle and Upper Villafranchian, as recorded by KRETZOI (1959) and JANOSSY (1973) in Hungary, BERZI et al. (1967) in Italy, RABEDER (1974) in Austria and FEJFAR (1961) in Czechoslovakia (*Blarinoides* sp.)

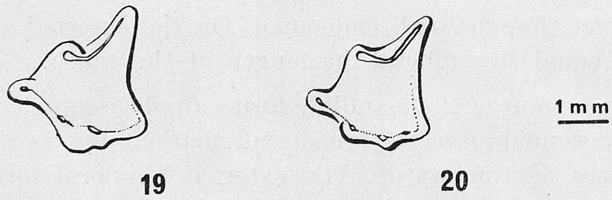


Fig. 19—20. Variability of P^4 in *Blarinoides mariae*. Explanations in text (p. 377)

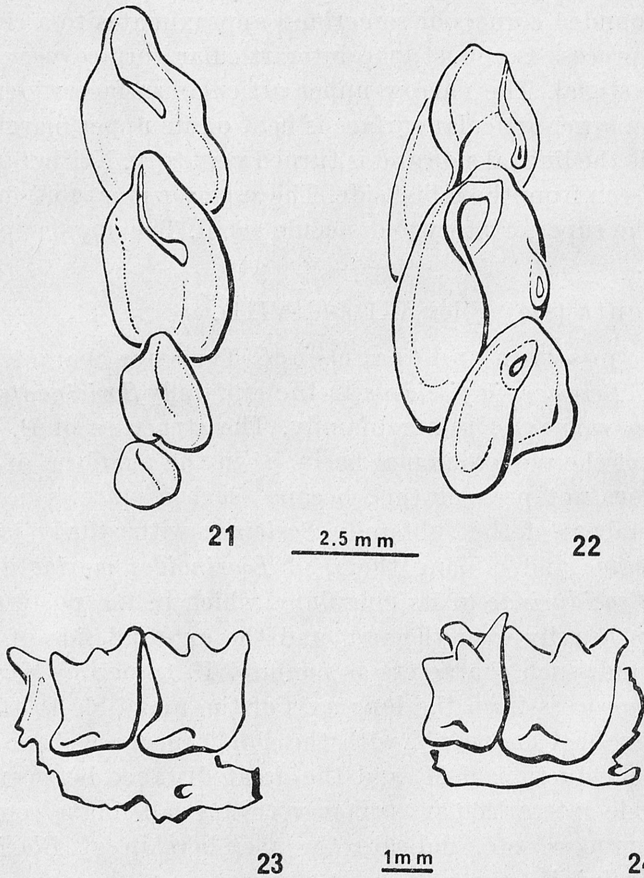
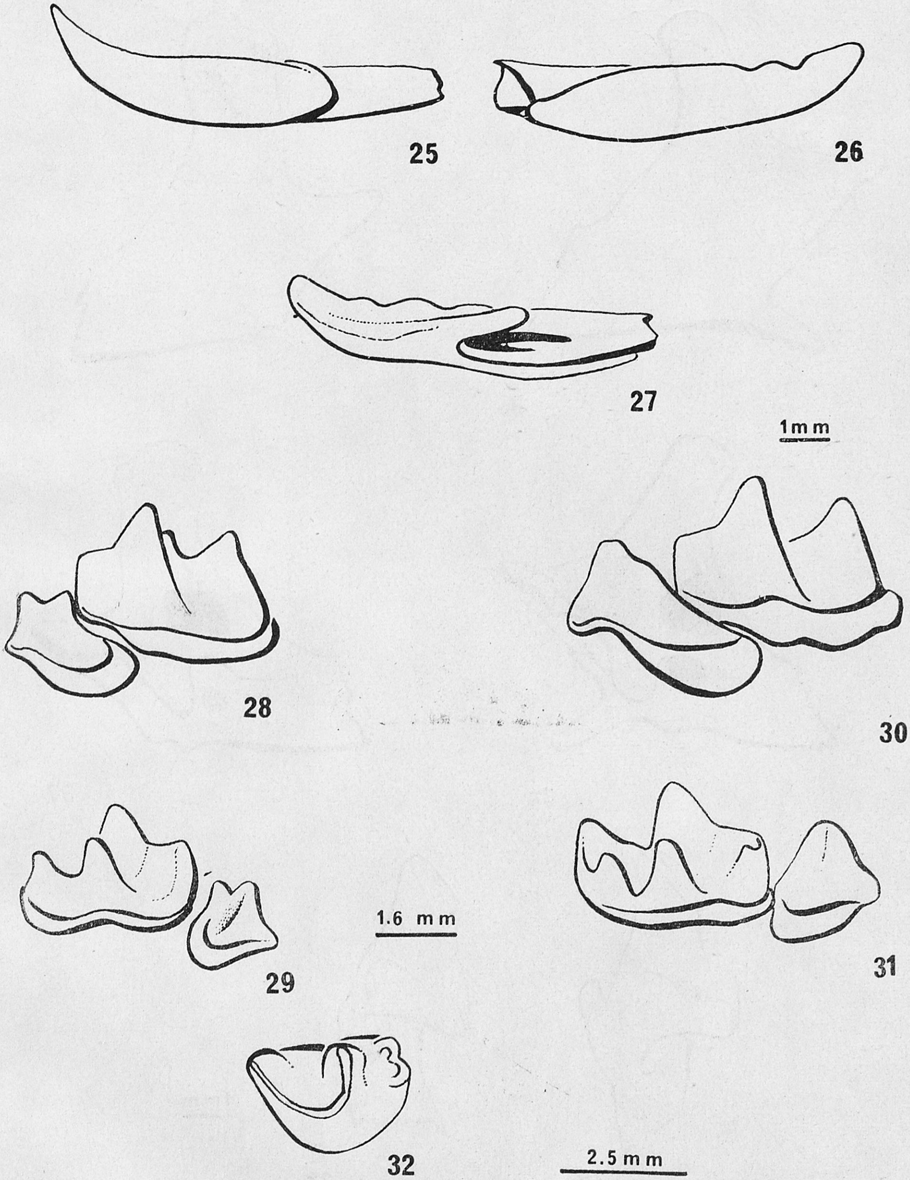


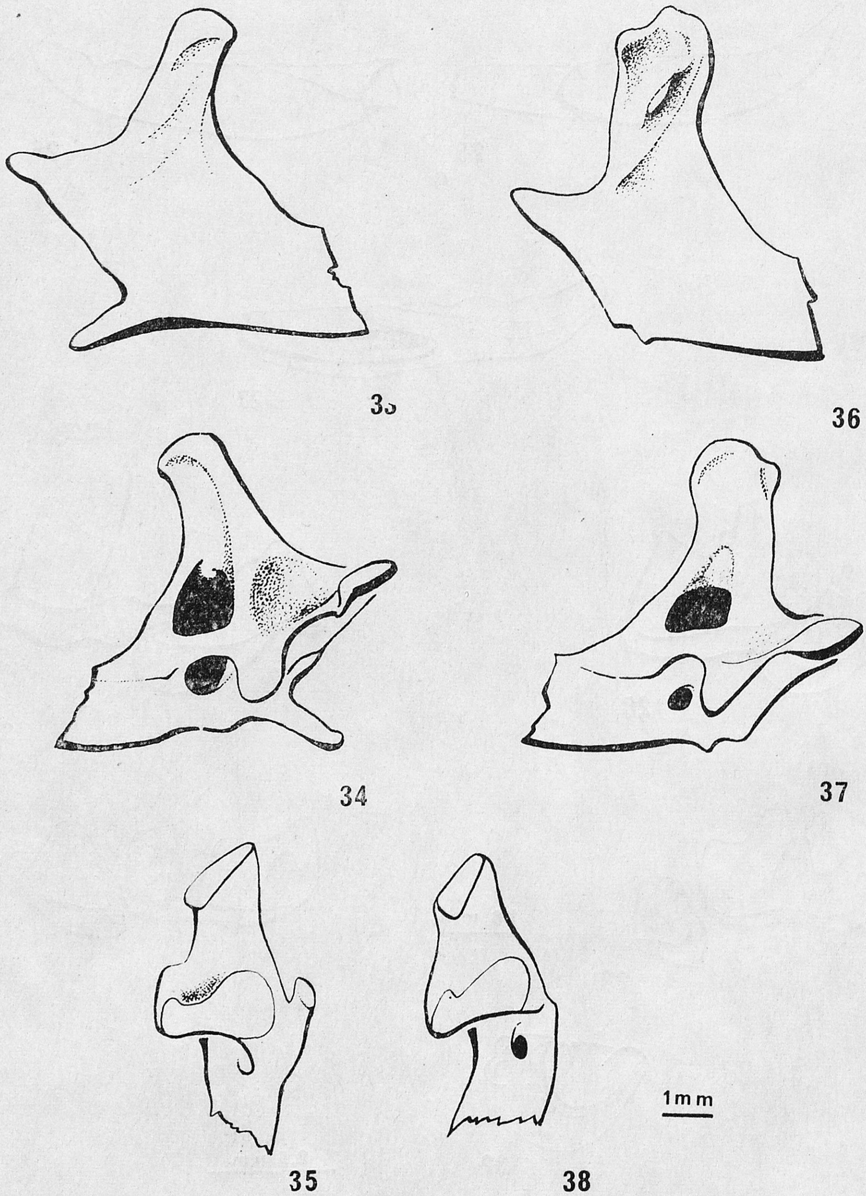
Fig. 21—24. Differences in morphology of upper teeth and maxilla between *Beremendia fissidens* (Figs. 21 and 23) and *Blarinoides mariae* (Figs. 22 and 24). Explanations in Table X

Comparison between localities. In Poland the remains of *Blarinoides* were found in 7 fossil localities, of which Podlesice and Kadzielnia provided very scanty materials. The whole material represents the period from the decline of the Miocene throughout the Günz Glaciation. A close analysis of the material showed no differences in size or essential differences in the morphology of the species discussed. The only noticeable difference was in the degree of molarization of the upper antemolar P^4. As has been mentioned in the description,



Figs. 25—32. Differences in morphology of lower teeth between *Beremendia fissidens* (Figs 25, 28 and 29) and *Blarinoides mariae* (Figs. 26, 27, 30 and 32). Explanations in Table X

this tooth has not only a well-developed protocone and hypocone but sometimes also an accessory cingular cusp, situated posteriorly to the hypocone. This cingular cusp does not occur or is vestigial in the specimens from Węże I (see Fig. 19), is poorly developed in the specimens from Rębielice Królewskie II, and very well developed in the teeth from Rębielice Królewskie I and Zamkowa Dolna (see Fig. 20). In the materials from Podlesice, Kadzielnia and Kamyk this tooth was missing. Nevertheless, this antemolar seems to have increased its degree



Figs. 33—38. Differences in morphology of mandible between *Beremendia fissidens* (Figs. 33—35) and *Blarinoides mariae* (Figs. 36—38). Explanations in Table X

of molarization in course of time and to have become more similar to molars. The specimens from Rębielice Królewskie I and II have also their superior pterygoid fossa deeper than it is in the specimens from the other localities.

Thus, as in *Beremendia fissidens* described above, the morphology of *Blarinoides mariae* did not undergo essential changes. Neither did the size of this species change.

Comparison between *Beremendia fissidens* and *Blarinoides mariae*. Although at first sight *Beremendia fissidens* and *Blarinoides mariae* discussed in this paper are very similar to each other on account of their nearly identical size, robustness and colour of pigmentation, they factually belong to two separate tribes of the subfamily *Soricinae*. This external resemblance and the fact that both these species had lived in more or less the same time and area caused that probably they were confused with each other and all specimens of the same size were included in *Beremenda fissidens*, the species commonly known for a long time. In spite of the fact that *Blarinoides mariae* probably appeared earlier, towards the end of the Miocene, and perished somewhat earlier, towards the

Table IX

Number of *Blarinoides mariae* in particular localities

Locality	% individuals	% remains
Węże I	71.80	68.29
Rębielice Królewskie II	66.66	72.22
Rębielice Królewskie I	78.72	77.35
Zamkowa Dolna	34.48	18.81
Kadzielnia	5.00	1.45
Kamyk	17.60	5.30

Numbers of individuals and remains of *Blarinoides mariae* as percentages of the numbers of individuals and remains of *Beremendia fissidens* in localities where these two species occurred together. At each locality the numbers of individuals and remains of *Beremendia fissidens* have been assumed to be 100%.

end of the Günz Glaciation, these two forms lived side by a side in the period from the Early Pliocene to the decline of the Günz, as has been demonstrated by investigations carried out in Poland and other countries, like France, Italy, Hungary and Czechoslovakia. It seems therefore that the presence of *Blarinoides mariae* may be expected also in other European regions in which *Beremendia fissidens* has been found.

In the territory of Poland, wherever these two species occurred together, the remains of *Beremendia fissidens* prevailed in number, and whereas in older localities the specimens of *Blarinoides mariae* formed about 70% of the population of *Beremendia fissidens*, in younger localities this proportion was dramatically lowered and did not exceed 20% (Table IX). Sence we do not know anything about the ways of life of these mammals, we are not in a position to decide whether *Blarinoides mariae* was in fact the less numerous species or whether it was only less accessible as prey to owls, one of the main factors responsible for the accumulation of remains of small vertebrates in deposits. What we can state

Table X

Most remarkable differences in the morphology of *Beremendia fissidens* and *Blarinoides mariae*

	Beremendia fissidens (PETÉNYI, 1864)	*Blarinoides mariae* SULIMSKI, 1959
1	2	3
Number of teeth and dental formula	$\frac{1-5-3}{1-2-3} = 30$	$\frac{1-6-3}{1-2-3} = 32$
I^1	Bifid	Nonbifid
Number of upper unicuspid teeth	4	5
Posterolingual cusps in upper unicuspid teeth	Lacking (see Fig. 21)	Present (see Fig. 22)
P^4	Hypocone fairly well developed, inconspicuous, or lacking; no cingular cusp behind hypocone (see Figs. 4—5)	Hypocone very well developed; cingular cusp mostly present behind hypocone (see Figs. 19—20)
M^1	Parastyle narrow, hypocone poorly developed (see Fig. 23)	Parastyle fairly wide, hypocone always well developed (see Fig. 24)
Shape of M^2, its width ratio $\frac{W1}{W2}$, position of zygomatic process	Square or rectangular; $\frac{W1}{W2}$ = min. 1.11, mean 1.21, max. 1.36; in occlusal view zygomatic process visible in extension of metastyle (see Fig. 23)	Trapezium; $\frac{W1}{W2}$ = min. 1.35, mean 1.41, max. 1.47; in occlusal view zygomatic process visible in extension of mezostyle (see Fig. 24)
Emargination of P^4 and upper molars	Moderate or fairly conspicuous (see Fig. 23)	Inconspicuous (see Fig. 24)
Cingulum in P^4 and upper molars	Faint, best seen between protocone and hypocone of M^1 and M^2	Faint, best seem on the posterior side of teeth
I_1	Cutting edge smooth, top bent markedly upwards, one or two grooves on the internal side of crown (see Figs. 6—8 and 25)	Three-lobed cutting edge, top bent slightly upwards, internal side of crown smooth (see Figs. 26—27)
P_4	*Sorex*-type tooth with large posterolingual basin, from external side makes impression of being bicuspid (see Figs. 28—29)	*Crocidura*-type tooth, without posterolingual basin, very top somewhat bifid (see Figs. 30—31)
Endoconid crest in M_1 and M_2	Present (see Fig. 29)	Lacking (see Fig. 31)

Table X (cont.)

1	2	3
Endoconid in M_3	Very faint or mostly lacking (see Figs. 9—11)	Present (see Fig. 32)
Shape of coronoid process	Narrow, strongly bent forwards (see Fig. 33)	Wide, slightly bent forwards (see Fig. 36)
Interarticular surface on condyloid process	Wide, lingual emargination moderate (see Fig. 35)	Very wide, lingual emargination slight (see Fig. 38)
Shape of internal temporal fossa	Triangle with rounded vertices or trapezium (see Fig. 34)	Square with rounded corners or circle (see Fig. 37)
External temporal fossa	Very shallow (see Fig. 33)	Shallow or medium deep (see Fig. 36)
Superior pterygoid fossa	Deep (see Fig. 34)	Medium deep (See Fig. 37)

is that in the cool phase of the Middle Villafranchian its number decreased by half (Zamkowa Dolna) and next it dropped systematically up to the complete extinction of this species.

The main and best-seen characters that differ these two species from each other are given in Table X. It shows clearly that their similarity is only superficial.

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STRESZCZENIE

Praca jest trzecią częścią opracowania całości szczątków *Insectivora* z neogenu i plejstocenu Polski. Zawiera ona spis nowego gatunku *Beremendia minor* n. sp. (*Soricinae*, *Neomyini*) z Rębielic Królewskich I, stanowiska datowanego na dolny wilafransz (skład fauny podaje Kowalski, 1960, 1964 i Rzebik-Kowalska, 1971) oraz opis dwu innych gatunków: *Beremendia fissidens* (Petényi, 1864) i *Blarinoides mariae* Sulimski, 1959 (*Soricinae*: *Neomyini*, *Blarinini*). Budowa morfologiczna *Beremendia minor* jest dokładną kopią *Beremendia fissidens*, natomiast wymiary nowo opisanej formy są dużo mniejsze zarówno od przedstawicieli *B. fissidens* z tego samego stanowiska, jak i od najmniejszych okazów tego gatunku z wczesnoplioceńskiego stanowiska Węże I. O istnieniu małego gatunku *Beremendia* wspomina już Fejfar (1964) z Czechosłowacji i Dehm (1962) z Republiki Federalnej Niemiec.

Beremendia fissidens została znaleziona w 9 stanowiskach (Węże I, Rębielice Królewskie I i II, Zamkowa Dolna, Kadzielnia, Kielniki, Kamyk, Zalesiaki i Kozi Grzbiet), obejmujących okres od wczesnego pliocenu po interglacjał kromerski, a *Blarinoides mariae* w 7 stanowiskach (Podlesice, Węże I, Rębielice Królewskie I i II, Zamkowa Dolna, Kadzielnia i Kamyk), obejmujących okres od późnego miocenu po schyłek zlodowacenia Günz.

Szczegółowa analiza materiału z 9 stanowisk, w których znaleziona została *Beremendia fissidens*, wykazała tylko nieznaczne różnice w budowie niektórych elementów uzębienia (I^1, P^4, I_1 i M_3) tego gatunku i nieznaczny wzrost rozmiarów form młodszych w porównaniu z formami starszymi.

Natomiast analiza szczątków *Blarinoides mariae* ze wszystkich stanowisk, w jakich ten gatunek występował, nie wykazała żadnych zmian w wielkości, a jedyną cechą zmienną w czasie, jaką udało się zaobserwować u tego gatunku, był stopień molaryzacji górnego przedtrzonowca (P^4), wzrastający u form młodszych.

Ogólnie jednak biorąc oba gatunki były niezwykle konserwatywne i przez cały okres istnienia ich budowa i wielkość nie uległy zasadniczym zmianom. Tam, gdzie oba gatunki występowały razem, liczebnie przeważała zawsze *Beremendia fissidens*. Ze względu na prawie tę samą wielkość i powierzchowne podobieństwo *Blarinoides mariae* może być niekiedy mylona z opisaną wcześniej i powszechnie znaną *Beremendia fissidens*. Cechy rozróżniające oba gatunki podaje tabela X.

РЕЗЮМЕ

Настоящая работа является третьей частью труда по насекомоядным из неогена и плейстоцена Польши. В ней приводится описание нового вида — *Beremendia minor* n. sp. (*Soricinae*, *Neomyini*) из Рембелиц Крулевских I, местонахождения, датированного верхним виллафранкским ярусом (Ковальский, 1960, 1964, Жебик-Ковальска, 1971), а также описание двух других видов: *Beremendia fissidens* (Petényi, 1846) и *Blarinoides mariae* Sulimski, 1959 (*Soricinae*: *Neomyini*, *Blarinini*). По морфологическому строению *Beremendia minor* n. sp. является точной копией *Beremendia fissidens* но по размерам описываемая форма значительно меньше, чем *B. fissidens* из этого же местонахождения, а также мелких форм этого вида из раннего плиоцена Венже I. О существовании мелкого вида *Beremendia* упоминали Фейфар (1964) из Чехословакии и Дем (1962) из Федеративной Республики Германии.

Beremendia fissidens найдена в 9 местонахождениях (Венже I, Рембелице Крулевске I и II, Замкова Дольна, Кадзельня, Кельники, Камык, Залесяки и Кози Гжбет), охватывающих период от раннего плиоцена до кромерского межледниковья, а *Blarinoides mariae* в 7 местонахождениях (Подлесице, Венже I, Рембелице Крулевске I и II, Замкова Дольна, Кадзельня и Камык), охватывающих период от позднего миоцена до конца оледенения гюнц.

Детальный анализ материала по *Beremendia fissidens* из 9 местонахождений показал, что существует лишь незначительная разница в строении некоторых элементов зубной системы (I^1, P^4, I_1 и M_3) этого вида и незначительное увеличение размеров поздних форм в сравнении с более древними формами. Анализ остатков

Blarinoides mariae, найденных во всех местонахождениях не обнаружил никаких изменений в размерах и лишь единственный признак в морфологии этого вида, изменявшийся во времени — это степень моляризации у верхнего премоляра (P^4), возрастающая у поздних форм.

Оба описываемых вида были очень консервативны и здесь за весь период существования их строение и величина не подверглись принципиальным изменениям. Там, где оба вида встречались вместе, численность *Beremendia fissidens* была больше. Из-за внешнего морфологического сходства и одинаковых размеров *Beremendia fissidens* и *Blarinoides mariae* трудно различимы. Однако, у них имеются значительные отличия. Признаки эти приводятся в таблице X.

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